

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

### LISTING OF CLAIMS

Claims 1-26 (canceled)

27. (previously presented) An apparatus as described in claim 29 wherein the controller means includes a dynamic model such that the controller means compensates for undesired motion of the base due to various motions of the wheels.

Claim 28 (canceled)

29. (previously presented) A mobile base movable relative to a surface, the base comprising:

a main housing;

at least two wheels pivotably and rotatably mounted to the housing, each wheel having a steering axis and a rotation axis with the steering and rotation axes nonintersecting and offset by a known caster distance;

drive means for rotating the wheels to roll along the surface;

steering means for pivoting the wheels and changing their heading with respect to the surface; and

controller means for reading an input vector from a host processor, wherein the input vector is a three dimensional force torque vector,

reading the steering axis headings,  
calculating a desired torque for each steering and rotation axis such that at any  
given time, the calculated resultant forces on the base reflect the input vector,  
regardless of the positions of the steering and rotation axes, and  
commanding the calculated torque to each steering and rotation axis,  
wherein the calculated torque of each steering and rotation axis is computed from the input vector  
and a generalized inverse of a constraint matrix, C, the constraint matrix being defined by the  
following kinematic relationship:

$$\vec{m}_a = C \vec{m}_x$$

where  $\vec{m}_a$  represents a motion axis vector and  $\vec{m}_x$  represents actual mobile base motion  
and wherein the generalized inverse of C is chosen such that a sum of squares of the axis torques  
is minimized.

30. (previously presented) An apparatus as described in claim 29 wherein the generalized inverse  
of C is chosen such that a sum of squares of wheel contact forces is minimized.

31. (previously presented) An apparatus as described in claim 29 wherein there is an  
instantaneous power for each of the steering and rotation axes and wherein the  
generalized inverse of C is chosen such that a sum of the instantaneous powers of all  
of the axes is minimized.